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ABSTRACT

This study examines the development of children's concepts of illness in light of Piagetian findings regarding the ontogenesis of causal relations. The Concept of Illness protocol was administered to 72 3-, 7-, and 11-year-old children; 24 from each age group. Children were interviewed individually in a school setting. Raters assigned subjects' responses to one of three categories: pre-logical, concrete-logical, and formal-logical. Within each of these major categories, two sub-types of explanations were distinguished. Thus, in addition to a category of incomprehension, six types of explanations of health and illness were developmentally ordered with chronological age utilized as a gross index of developmental status. Each type of explanation is described. Types include: Phenomenistic, Contagion, Contamination, Internalization, Physiological, and Psycho Physiological. (Author/SB)

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The Development of Children's Concepts of Health and Illness[1,2]

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During a routine visit to a doctor's office, a seven year old explained quite guiltily that he had gotten the rash on his body (which the doctor had diagnosed as a heat rash) as a consequence of refusing to eat the soup his mother gave him for lunch, running out the back door into the woods behind his house and getting "poisoned ivy." His nine year old sister laughed at his account telling him he had really acquired the rash when he took several licks from his friend's popsicle and swallowed the germs.

In our role as clinical psychologists in a family practice residency training program, we have repeatedly observed how children's beliefs and assumptions about health, illness and medical procedures differ dramatically and in unexpected ways from those of adults. Such instances have made us acrutely aware that professionals -- physicians, psychologists, nurses -- do not possess a general framework which would allow them to understand the structure of children's thought -- a structure out of which such diverse conceptions of health and illness are generated. Consequently, many professionals have no basis for understanding how children of different ages will construe various illnesses or interpret medical procedures and

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cannot deal with the child in ways appropriate to the child's level of cognitive functions. That professionals sometimes operate in the dark in this area was dramatically driven home to us when we explored the basis of young children's fear of such an innocuous instrument as the stethoscope. A sensitive physician may, for instance, try to respond to a child's fear of the stethoscope by warming the diaphragm prior to use, assuming that the cold metal against the child's skin causes some of the negative response. It was startling to learn that four and five year old children, when asked about the stethoscope, made no mention of the "coldness," but told us of their belief that the purpose of the stethoscope was to discover "whether or not I have a heart" -- a heart which they say "is what makes me live." A negative finding by the physician then, as the child sees it, could result in the child's being dead. Small wonder that warming the diaphragm does little to console a child whose fears are based on such beliefs.

An extensive search of medical and psychological literature revealed that while there have been a few studies which attempt to document the development of children's concepts of the internal anatomy and physiology of the body (Nagy, 1950; Gellert, 1962), no study has been reported which documents the nature and development of young children's concepts of health, illness, and medical procedures.

The aim of our investigation is to specify the concepts which underlie the frequent contents given by children regarding their notions of health, illness and medical procedures.

The study is based on the developmental principles of Piaget (1919; 1930) and Werner (1948) who have repeatedly demonstrated that children adhere to a logic which is qualitatively different from that of adults, because it relies on different principles, and further, that this logic follows a developmental order or sequence. The major hypothesis of this study is that

children's concepts of health, illness and medical procedures will be consistent with Piagetian and Wernerian findings regarding the ontogenesis of causal relations.

As is well known, the qualitative differences in cognitive processes delineated by Piaget (1929, 1930), Werner (1948), and others reflect different types and degrees of differentiation between the self and other, between what is considered internal and a part of the self and what is external to the self and belongs to the world. If our findings were to be consonant with other previous studies in this area, then we expected a lack of self-other differentiation in the pre-logical (2-6 years) stage such that perceptual aspects of the world dominate a child's causal thinking, some degree of self-other differentiation in the concrete operational stage (7-10 years) such that cause and effect are linked through the concrete activities of the child, and definite self-other differentiation in the formal operational stage (11 years and older) such that the child can compensate for the stimulus pull of perceptual appearances through the use of abstract logic.

Delineation of the development of concepts of health, illness and medical procedures has both a scientific and applied value. With reference to the former it would generalize the findings of Piaget (1929; 1930) and Laurendeau and Pinard (1962) who studied the development of children's concepts of number, space, time, causality, to novel content areas. The latter aim would be its use by all professionals, including physicians, psychotherapists, and educators, who must communicate with children regarding their concepts of illness and routine medical procedures.

Based on a previous study, examining children representing each age group from 3 to 13 years, we articulated a developmental category system for children's explanations of health and illness as well as a category system for their explanations of routine medical procedures.

The present study was carried out to verify the adequacy of this category system, in terms of both the content of the various explanations as well as the developmental ordering of those explanations. We shall report here only on the development of conceptions of health and illness. The development of conceptions of medical procedures is reported in another paper.

Method

Subjects. Three groups of subjects were employed: 4 year olds who could be assumed to be in the Piagetian pre-logical stage; 7 year olds who could be assumed to be in the stage of concrete operations; 11 year olds assumed to be in formal operational stage. There were 24 subjects in each of the three groups, half male and half female, drawn from a similar socio-economic level and having no known cognitive or emotional deficits.

A "Concept of Illness Protocol" developed onthe basis of extensive pilot studies was utilized. The protocol contained 12 sets of questions with each set probing the child's cognitive functions about a signe notion (e.g., "Were you ever sick?" How did you get sick?" "How did you get better?" "What is a headache?", etc. "What is a heart attack?" etc. "What are measles?", etc. "What is pain?", etc.)

The protocol was modeled on Piaget's (1929;1930) and Laurendeau and Pinard's (1962) questionnaires regarding causal thinking (e.g., Concept of Life, Concept of Dreams) and were designed to elicit reponses which revealed the quality of the child's reasoning in contrast to simple "yes/no" responses. That is, the inquiry was designed to tap the cognitive processes which children relied on in their answers.

Procedure. Children were interviewed individually in a school setting. While the series of questions used in each interview were essentially uniform across subjects, the utilization of Piaget's "clinical method" allowed further probing when the quality of the child's reasoning was not evident in the response, that is, when a response was sparse, vague or unclear.

Results

The category system derived earlier to account for the development of concepts of health and illness was utilized to categorize the concept of illness manifested by each subject. In assigning each subject's response to one of the categories of explanation, we considered the configuration of the responses as a whole, as did Piaget and Laurendeau and Pinard, rather than scoring each separate response. The protocols were scored blindly by two independent scorers with good reliability (88% agreement). Category assignments for protocols where raters disagreed were mutually discussed and agreed upon.

In general, we had derived three major types of explanation, consonant with Piagetian stages of cognitive development -- pre-operational, concrete operational, formal operational. Within each of these major categories, we were further able to distinguish two sub-types of explanation. Thus, in addition to a category of incomprehension (Type O) we delineated six other types of explanations of health and illness which were developmentally ordered with chronological age utilized as a gross index of developmental status. "Incomprehension" represents the least mature type of explanation while "Psycho-physiological" explanations were the most mature type.

Before considering the content of each type of explanation, let us look at the frequency distribution of the subjects responses. Consistent with the expectations of a cognitive-developmental framework, we found that the type of explanation of illness varied as a function of the developmental status of our subjects. (See Table 1) Among the four year olds, 70.8% were categorized as giving Contagion explanations (Type 2), while 12.5% gave a Phenomenistic explanation (Type 1) and 16.7% gave Contamination explanations (Type 3). Among the seven year olds, 75% gave Contamination explanations (Type 3) while 16.7% gave Contagion ex-

planation (Type 2) and 8.33% gave Internalization explanations (Type 4). Among 11 year olds, 70.8% gave Physiological explanations (Type 5) while 25% gave Internalization explanations (Type 4), and 4.2% gave Psycho-physiiological explanations (Type 6).

Discussion

The interpretation of the data, in novel content areas, in ways which are readily congruent with the classical developmental studies in causal thinking is encouraging.

We will now describe the category system and its implications in terms of Werner and Piaget's developmental frame of reference.

Pre-logical Explanations

Incomprehension. This explanation is characteristic of three year old children. The child responds with "I don't know" or gives answers that evade the how and the why of the question, or gives unrelated responses.

Ex: "Cancer is like the wizard."
What causes cancer? "I wouldn't like to have it."

In the two other types of explanation characteristic of children in the prelogical stage -- Phenomenistic explanation (Type 1) and Contagion explanation (Type 2) -- the lack of differentiation between self and other is clearly manifest. In both types of explanation, we see children being overly swayed by the immediacy of some aspects of their perceptual experiences. Their inability to distance themselves from their environment resulted in explanations which accounted for the cause-effect relationship in terms of the immediate spatial and/or temporal cues which dominate their interaction.

Phenomenistic Explanation. This type of explanation is characteristic of four and five year olds. Illness is described in terms of sensory impressions, i.e., sights and sounds associated with the illness via spatial or temporal contiguity or perceptual similarity. The

child invokes as the effective cause of his illness a locus which to an adult who distinguishes between what is internal and external, would be conceived of as external to the self and at best a very remote or inappropriate cause of the illness (sun, God).

Ex: Headache is from the wind.
Pain is because its red.
Heart attack is when some people beep the horn.
God makes a cold go away. He's magic.
Heart attack is falling on your back.
Headache is lying down.

Contagion. This type of explanations characterize five and six year old children. While the child still manifests an inability to distance himself from some aspects of his perceptual experience, he is now preoccupied with the link between sensory phenomena and the illness rather than with the illness itself. That link is conceptualized as "magic" and is manifest in the content as an overwhelming preoccupation with contagion. It is critical to note that while self-other fusion still characterizes his explanations the perceptual experiences which dominate the child's thinking are now less physically remote from the child's body. Whereas a child who relied upon a Phenomenistic explanation fused himself with objects that were physically remote -- e.g., trees, sun -- the child now circumscribes the limits of the self-world fusion to include only his immediate universe -- e.g., people who walk near to him.

Ex: Measles are from other people. (Ques.) When you walk near them.
(Ques.) When you go near them.
A headache is from leaning against something.
A cold is from other people.
Doctor makes it go away.
Medicine makes it better.
A heart attack is when you chew something and the heart gets hard (no contact between "something" and "heart").
A cold gets better by staying in (out of contact with agents of cold).
A cold is when your coat is off.

As in the Phenominstic type of explanation, there is manifest here no control by the

child over the onset or cure of illness. The child is a victim of magic.

Concrete-logical Explanations. In what Piaget has called the concrete operational stage, roughly manifest by children between seven and ten years of age, we found, as expected, the major developmental change to be in the accentuation of the differentiation between self and other, such that the child clearly distinguishes between what is internal and external to the self. A major factor related to the differentiation of external and internal is in terms of the concrete activities of the subject. This distinction was manifest in the two explanations characteristic of this age group.

Contamination. In this type of explanation, which characterizes younger children in this age group, the locus of the illness is at the surface of the body. The cause of the illness is either concrete, physical contamination of the surface through uncleanliness or dirt, or moral contamination via bad or immoral observable behavior. This type of explanation is evident in the first example cited in this paper where the child believes his heat rash is due to his refusal to eat the lunch his mother made and his subsequent touching poison ivy. The concrete acitivity of the child linking cause and effect, external and internal, is usually some form of touch. Mentioned frequently are the absolutistic categories of dirty-clean; good-bad.

Ex: Germs are kissing someone.
Healthy is to be active and keep clean.
Headache is when you're noisy and your mother doesn't want you to be.
Headache gets better when you rub something on your forehead.
Measles are little bumps on your stomach.
Measles are when you touch something poison.
Healthy is when you're good to each other.
Cancer is smoking without your mother's permission.
Germs are when you lick something after someone.
Measles go away when the doctor rubs some grease stuff on you.

The child giving Contamination explanations manifests slightly more control over the cause

and cure of illness, e.g., avoid the contact or rub something on the skin to cure the illness.

Internalization. This type of explanation is characteristic of nine and ten year old children. In contrast to the Contamination explanation, in which the surface of the body was the primary source or locus of illness, the Internalization explanation locates illness, in a global way, within the body. The child is focused at this stage with the way in which illness gets from outside to inside -- how it is internalized -- and spells out the internalization process or the concrete activities which link cause and effect, e.g., the ingestion or swallowing of germs or bugs. Still incomplete is the differentiation between self and the other which is manifest in the child's inability to specify in detail the internal physiological processess. Any reference to internal structures or functions is in terms of concrete analogies. Apparent in this stage is a greater sense of control over the cause and/or cure of the illness. While external agents (e.g., doctor) can help, a person can also begin to cure him/herself or even prevent illness through proper care. Health and illness are seen as more long term conditions.

Ex: A cold is when the cold air gets inside you.
A headache is a pain in your forehead.
Aheart attack is the heart beats too fast.
Cancer is in your lungs and legs.
Cancer is from smoke getting into your lungs.
Germs are little things that get into your body...little bugs.
Cancer is from smoking when you're small.
A heart attack is when your heart goes down and down.
A heart attack is from not eating the right food.

Formal-logical Explanations. In the most advanced stages of cognitive development, i.e., the formal operational stages, we found as expected, the kind of relativistic thinking that is the product of abstract operations. At this stage, there is the greatest amount of differentiation between the self and the other, or conversely, the organism is least likely to manifest the effects of stimulus boundedness because of the compensatory character of opera-

tional or logical thinking. In both the Physiological and Psychophysiological explanations of this stage, we note the greatest amount of differentiation between external and internal world, such that the source of illness is located within the body even though an external agent is often described as the ultimate cause.

Physiological Explanation. This explanation characterizes ten to twelve year olds. In this explanation, while the cause may be triggered by external events, the source and nature of the illness lies in specific internal physiological structures and functions. The internal processes are not always concretely delineated but are often described as invisible. Cure is seen as something that happens within the body which may be the result of outside intervention or the natural healing processes in the body. The causal link between illness and its causes is always specified in terms of physical events. Illness or health are seen as possibly being very long term conditions.

Ex: A heart attack is when the heart stops pumping blood.
Healthy is to be strong, to eat good.
Cancer - you can be born with it.
Germs are invisible - you can't see them.
Pain is from injury of a muscle.
A headache is from pressure inside your head.
Medicine has special chemicals that travel in your blood.

Psycho-physiological Explanation. This explanation characterizes children 13 and, we assume, older. As in the Physiological explanation, the illness is described in terms of internal physiological processes, but the child now perceives an additional or alternative cause of illness, that is, psychological cause. The child is aware that a person's thoughts or feelings can affect the way his or her body functions.

Ex: A heart attack is when you are all nerve racked.
A headache is from problems and aggravations.
A headache is when you're all nervous and weary.
A headache is when you drink too much and worry too much.

What is striking at this formal operational stage is that in the earlier emerging of these two explanations, i.e., Physiological, the body parts or organs become differentiated from the self, ("my heart" and "me" are not synonymous), while in the later emerging explanation -- Psycho-physiological -- not only are the internal organs differentiated from the self, but so also are the feelings of the person (e.g., "worries cause headaches").

In the applied area, the specification of norms for such conceptions, how these conceptions change with age, and the cognitive processes that underly these contents and conceptions should have practical significance in three major ways. First, such an ordering should make it easier for professionals to grasp the invariant cognitive principles that underly what now appears to many professionals, initially, as the infinitely varied, the "quaint" content character of children's explanations. The converse is also, however, true. Developmentally oriented clinical psychologists may well know the general cognitive principles which are applicable in the area of causal thinking, and yet be unable to predict how a particular form of cognition will manifest itself normatively with respect to a particular content. This was our experience which made this research fascinating at the level of marvelling at a specific response or the pattern of one child's conceptions.

Secondly, if professionals know children's conceptions in these areas it may have many beneficial uses: a health professional may be better able to directly provide medical or psychotherapeutic explanations which come closer to where that child is at, or indirectly, the health professional can interpret to the parents, or to the teachers why the child may be unduly apprehensive about a medical procedure which an adult considers innocuous. Lastly, psychotherapists, of various schools, often use interpretations which universalize and hence normalize a report which a patient may erroneously consider to be highly idiosyncratic. The normative data from these and other studies currently underway may well be helpful to such ends.

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Table 1

Percentage of Subjects Manifesting Various Types

of Explanations of Health and Illness

Type of Explanation	4 years (N=24)	7 years (N=24)	11 years (N=24)
0 Incomprehension			
1 Phenomenistic	12.5%		
2 Contagion	70.8%	16.7%	
3 Contamination	16.7%	75.0%	
4 Internalization		8.3%	25.0%
5 Physiological			70.8%
6 Psycho-physiological			4.2%